

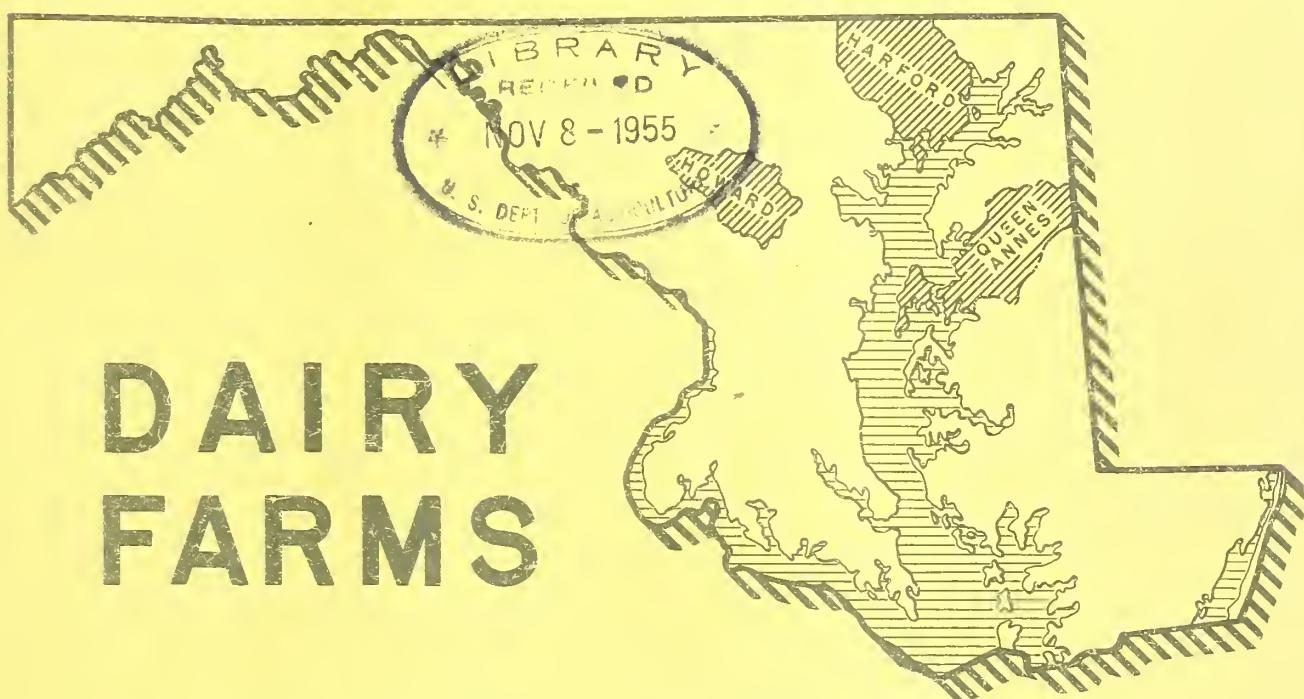
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# PRODUCTION ADJUSTMENTS — on — MARYLAND



## DAIRY FARMS

United States Department of Agriculture

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U.S. Bureau of Agricultural Economics

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PRODUCTION ADJUSTMENTS ON MARYLAND DAIRY FARMS 11

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## INTRODUCTION

Early in 1945 the Department of Agriculture and the State Colleges of Agriculture appraised the opportunities farmers would have after the war for making profitable adjustments in farming, if national prosperity could be maintained. The findings of each State Agricultural Production Adjustment Committee were published, together with a national summary of all State reports 1/. Only generalized conclusions could be given in the Maryland report made at that time. Sufficient data on the kind of farming practices currently used and the proportion of farmers who were using each practice were not readily available and more time was needed for making an appraisal of the opportunities for adjustment on farms of different types and sizes.

This report gives the results of a continuation of the more generalized study reported in 1944. Information on the management of a total of 98 large, medium, and small dairy farms was obtained from the farm operators during the winter of 1944-45. The analysis of this information provides a cross-section summary of the kind of farming practices dairy farmers in Maryland are now using, and provides a better basis for suggesting the adjustments in farming that would be profitable on each group of farms and their probable effect on farm income.

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1/ "A Post-war Pattern in Maryland Agriculture", Bureau of Agricultural Economics, December 1944 (mimeographed). "Farming Adjustments After the War--Possibilities Under Prosperity Conditions", U. S. Department of Agriculture in cooperation with the Land-Grant Colleges, June 1945 (mimeographed).

The main dairy areas of the State are in the north-central part. Approximately two-thirds of the total milk production in the State comes from the long-established dairy farms in counties west of Chesapeake Bay and one-third comes from the Eastern Shore, where dairying has become important in the last 20 years. To give a proportion sample, Howard and Harford Counties in the western area and Queen Annes County on the Eastern Shore were selected for study (see map on cover). First, 400 or 500 farms in each county were chosen at random in January 1944 from a list of all farms in the county. These selected farms were then ranked according to the number of dairy cows in the herd. The array showed that herds of 7-9, 19-21, and 30-35 cows were frequently found in all counties. Numbers of other livestock and the land use characteristics of farms in these size groups were then summarized; and where numbers of farms in each group were large enough, subgroups of farms were made that most nearly represented the modal characteristics of major land use and other livestock enterprises. A random sample of about 15 farms in each county was then taken from each subgroup. The samples from the subgroups were designated as small, medium, or large dairy farms according to the number of dairy cows. A schedule of information was obtained by a personal visit to each of about 10 farms in each of the size groups in each county. A total of 98 farm records was obtained.

#### FARM ORGANIZATION AND PRACTICES COMMONLY USED ON DAIRY FARMS

##### The Physical Plant

Land.- The average large dairy farm in Maryland contains about 240 acres of land, of which 160 are used for crops including cropland pasture and 40 for permanent pasture. The remainder is in woodland and miscellaneous uses. These acreages are about 80 percent as large on a medium-sized farm and about 60 percent as large on a small farm.

The utilization of the land in dairy farms in western Maryland differs markedly from the use on the Eastern Shore. In Queen Annes County, where the land is more level and the soils are lighter, the acreage of cropland is about double that on a dairy farm of the same size in Harford and Howard Counties (table 1). One reason for this difference is the lack of permanent pasture and the need for greater use of cropland pasture in Queen Annes County. Another reason is that most of the farms in Queen Annes County are operated by tenants under a leasing system that encourages the growing of grain crops for sale.

Table 1.- Typical acreage of land operated and utilization of land, by size groups and by counties, 1944

Size group and county	Total acreage of land operated	Cropland	Permanent pasture
	Acres	Acres	Acres
<b>Large farms:</b>			
Queen Annes County	275-299	200-209	-
Harford and Howard Counties	175-199	100-109	50-59
<b>Medium farms:</b>			
Queen Annes County	175-199	160-169	-
Harford and Howard Counties	125-149	80-89	30-39
<b>Small farms:</b>			
Queen Annes County	75-99	70-79	-
Harford and Howard Counties	75-99	50-59	10-19

Labor.- The labor force on the average large farm is equivalent to about 3 full-time men. This is 35 percent larger than the average for the medium-size group and twice that for the small farms (table 2). The operator and members of his family are the main source of labor on the small and medium-sized farms. Hired labor makes up a larger proportion of the total on the large-size group. One or two regular hired men and additional hired seasonal labor are found on most of these farms. Field crews for harvesting vegetables are found more frequently on the large farms.

Table 2.- Average labor force measured in man equivalents,  
by size of farm, 1944 1/

Kind of worker	Average man equivalents		
	Large farms	Medium farms	Small farms
		Number	Number
Male family workers 2/	1.32	1.17	.99
All other family workers	.05	.04	.03
Regular hired workers	1.26	.79	.25
Seasonal hired workers	.18	.08	.03
Total labor force	2.81	2.08	1.30

1/ A man equivalent represents the farm work done in a 12 months' period with all work expressed in terms of that performed by an able-bodied man devoting full time to the farm work.

2/ Fourteen years old and older.

The average amount of productive work done per man equivalent was practically the same on large and medium-sized farms and was about 10 percent more than was done per man on the small farms (table 3). This does not mean that an average man on small farms worked fewer hours or less diligently. The difference was caused by a more efficient size of business, using more machinery, and similar means. With them a man on a large or medium-sized farm does more productive work in 12 months than a man on a small farm does in 13 months.

Table 3.- Average amount of work done annually per man equivalent, by size of farm, 1944

Size of farm	Per man equivalent	
	Cows kept	Total productive man work units 1/
	<u>N u m b e r</u>	
Large farms	11.0	320
Medium farms	9.7	318
Small farms	7.8	287

1/ A man work unit is the average amount of productive work accomplished by an able-bodied man in a 10-hour day under average farm conditions using customary farm equipment.

Equipment.- Fifty-nine tractors were owned by the 98 farmers in the sample. On the large farms, 9 out of every 10 farmers owned a tractor. On the medium and small farms the proportion was 6 out of 10 and 3 out of 10, respectively. Nearly one-half of these tractors had been purchased during the war period (since January 1942). Of the newer harvesting machines, only 2 combines were owned by these 98 farmers. Combining was done on a custom basis on 13 of the farms, and on 3 farms a cornpicker was hired. Pickup balers were hired on 4 farms for baling hay or straw. Practically all of the threshing was on a custom basis. In general, the larger farms are more highly mechanized for field work, especially with haying machinery, than those of the other size groups.

One-third of all the farmers used milking machines. Most of the machines are on the large farms; only one operator of a small farm milked with a machine in 1944 (table 4). Nearly 20 percent of the milking machines had been installed during the war.

Table 4.- Percentage of the operators who owned and used various pieces of field or barn equipment, by size of farm, 1944

Item	Percentage owning and using specified equipment		
	Large farms	Medium farms	Small farms
	Percent	Percent	Percent
Tractor	91	59	31
Corn planter	100	100	100
Cultivator (2 horse)	69	83	78
Cultivator (tractor)	62	38	22
Drill (horse)	94	94	97
Drill (tractor)	6	6	0
Grain binder	75	85	78
Grain combine	6	0	0
Mower (horse)	84	85	97
Mower (tractor)	44	27	3
Rake (dump)	47	62	97
Rake (side delivery)	72	41	3
Hay loader	56	38	0
Buckrake	0	3	0
Hay fork	97	88	12
Manure spreader	100	100	34
Lime spreader	75	62	34
Milking machine	72	26	3

Buildings.— New construction and remodeling of buildings has occurred from time to time, but buildings on most of the farms have been used for many years. On the small farms, fewer dairy barns and milk houses and more poultry houses have been built in the last 10 years than in the other groups (table 5).

In spite of the many changes made recently, building facilities, especially those for the dairy enterprise, are inadequate. On many farms cows and youngstock were badly crowded in 1944. Only 19 percent of the operators of large farms and about 50 percent of the operators of smaller farms had stable facilities for additional cows. Most of the old dairy barns had been remodeled and enlarged several times. Inconvenient arrangement of the livestock which causes inefficient methods in doing all barn chores was evident. For example, manure was removed by driving through the stable daily with a spreader on only 5 large farms and 1 medium-sized farm. Only two farmers on large farms had manure carriers. All other farmers either used a wheelbarrow or threw the manure on a heap or wagon. Silos were found on 69 percent of the large farms, 50 percent of the medium, and 22 percent of the small farms. They were often so located, however, that the silage was carried a considerable distance to scattered tie-up spaces in the barns.

Table 5.- Percentage of operators who made specified changes in farm buildings and services in the last 10 years, by size of farm

Kind of change and building or service	Percentage of operators who made change		
	Large farms	Medium farms	Small farms
	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
<b>New construction:</b>			
Dairy barn	22	18	6
Milk house	22	12	3
Silo	3	3	0
Poultry house	6	6	16
Other sheds and barns	9	6	15
Dwelling	0	3	2
Tenant house	6	3	0
<b>Remodel:</b>			
Dairy barn	25	18	16
Milk house	0	3	6
Dwelling	0	0	9
Tenant house	3	0	0
<b>Service installation:</b>			
Water system	6	9	6
Electricity	9	9	6
Telephone	0	3	0

Farmers had the money and wish to make changes, but wartime restrictions have retarded improvement in building facilities.

#### Management

The average age for all operators was 44 years. No significant difference existed between the size groups regarding the average age. The average man equivalent of the operators was 0.89 per farm. It decreased with the decrease in size of farm, but the difference was not statistically significant. All farms but one were operated by men.

#### Tenure

Seventy-one percent of the operators were owners and 29 percent were tenants. The proportion of owners and tenants was practically the same for all size groups. All but 2 of the 28 tenants were located in Queen Anne's County.

The extent of tenancy in Queen Anne's County is one of the main factors influencing the type of agriculture. Generally, a crop-share lease is used whereby all crops, except roughages, are shared equally by the tenant and owner. The owner furnishes the land, buildings, and some of the fertilizer and lime; the tenant furnishes labor and equipment. In general, the tenant

owns the livestock and receives the income from it. This type of lease discourages the production of roughage and livestock, and the provision of adequate barns and facilities for livestock production is retarded.

Many believe that, for the long-time benefit of both the owner and the tenant, a change in this leasing system is desirable. Some progress toward a change has been made. A rental payment for the use of adequate live-stock facilities has been suggested by the State University. Under this agreement the owner maintains the dairy equipment and the tenant pays a cash rent for the use of it. 2/ A desirable leasing agreement should bring about the most profitable system of farming that is compatible with the maintenance of soil fertility.

#### Crops and Cropping Practices

Crop rotations.— Maryland is in a transition zone with respect to the adaptation of crops. Hence there is much flexibility in the use of crop-land, but the cropping system is centered more around grains than around grasses. A 4-year rotation of corn and truck crops, small grains, hay, and pasture is used most frequently on all size groups in Queen Annes County, where truck crops are grown on a large number of the farms as a supplementary enterprise. In the other two counties corn is used most frequently as the only intertilled crop. Where the acreage of permanent pasture is large rotation pasture is not included, and sometimes a small-grain crop is grown for 2 years in succession.

Crops grown and yield per acre.— Corn, hay, and small grains are grown on almost all farms (table 6). Corn for silage is grown on a larger proportion of the large farms than of the other size groups. Mixed clover hay is the most important kind on all farms. Alfalfa was grown on about one-half of the large farms and one-fourth of the medium-sized farms studied in 1944. In Queen Annes County corn is seldom ensiled and alfalfa is not an important hay crop; but the acreages used for commercial vegetables are larger.

Differences in crop yield between the three groups were almost negligible in 1944, but the average yields on these farms were considerably higher than for the State as a whole (table 7).

The pasture period of about 175 days was not greatly different for the three size groups. More acres were available for each animal unit on pasture on the small farms than on farms of the other size groups, but a larger proportion of the total acreage on the small farms was from permanent pasture and doubtless of a poorer quality (table 8).

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2/ For a detailed discussion of the tenancy problem in a nearby area see Urquhart, N. R., "Suggested Adjustments in Rental Agreements and Farming Practices on Tenant Farms in New Castle County, Delaware" (mimeographed) USDA., Bureau of Agricultural Economics and the University of Delaware, June 1942.

Table 6.- Percentage of operators who grew specified crops and average acreage for those growing the crop, by size of farm, 1944

Crop	Percentage growing crop			Average acreage for those growing crop		
	Large farms	Medium farms	Small farms	Large farms	Medium farms	Small farms
	Percent	Percent	Percent	Acres	Acres	Acres
Corn for grain	97	100	97	24.4	22.3	19.0
Corn for silage	66	44	16	10.0	9.0	4.1
Wheat	91	85	81	34.6	34.0	16.7
Barley	47	44	28	18.3	15.0	7.1
Oats	9	15	16	7.7	12.4	10.0
Rye	9	0	3	8.7	1/	1/
Clover-timothy	88	88	81	29.0	26.2	14.0
Alfalfa	47	26	6	13.9	9.1	1/
Soybeans for hay	22	47	50	18.4	9.3	5.2
Oats for hay	0	7	3	1/	1/	1/
Timothy	3	3	3	1/	1/	1/
Sudan grass	0	0	3	1/	1/	1/
Lespedeza	6	0	3	1/	1/	1/
Tomatoes	31	35	31	2.0	4.4	3.4
Sweet corn	22	29	25	11.3	11.7	6.0
Potatoes	0	7	9	1/	1/	1/
Popcorn	6	3	0	1/	1/	1/
Peas	0	3	0	1/	1/	1/

1/ Percentage of farmers growing crop was so small that average acreage data are of little value.

Table 7.- Average yield per acre for major crops on 98 Maryland dairy farms compared with State average yield, 1944

Crop	Unit	Yield per acre		
		98 dairy farms	State average	1/
Corn for grain	Bu.	40.6	35.0	
Wheat	"	25.5	23.5	
Barley	"	32.2	31.5	
Oats	"	35.5	30.0	
Corn for silage	Tons	9.9	7.5	
Clover-timothy hay	"	1.34 2/	1.05	
Alfalfa hay	"	2.41 3/	1.80	
Soybean hay	"	1.38	-	

1/ "Crop Production", July 1, 1945 and "Crops and Markets" January 1945.

2/ Average includes tonnage from second cutting on 14 of the 84 farms growing clover-timothy hay.

3/ Average includes tonnage from second cutting on 20 farms and from third cutting on 15 farms of the 25 farms growing alfalfa hay.

Table 8.- Percentage of operators who used specified kinds of pasture and average acreage for those using each kind, by size of farm, 1944

Kind of pasture	Percentage using pasture			Average acreage for those using pasture		
	Large farms	Medium farms	Small farms	Large farms	Medium farms	Small farms
	Percent			Acres		
Permanent	66	65	62	48.5	36.6	27.6
Aftermath	72	65	25	24.4	20.4	15.2
Cropland	59	53	53	40.5	23.0	20.8
Supplementary	22	15	22	27.2	12.2	11.3

Permanent and cropland pasture provide about 70-80 percent of the pasturage for dairy cows in all groups (fig. 1). Very little improvement of permanent pasture has been made on farms in any of the size groups. Cropland pasture is used extensively in Queen Annes County. It generally is a part of the rotation and consists of mixed grasses with some red or alsike clover. Lespedeza is also successfully grown for pasture or hay on the Eastern Shore. In 1944, a few farmers grew ladino clover, which is a relatively new but promising crop in the northern part of the western dairy area. But it must be tried further to determine its permanent place in the cropping systems in Maryland. Grazing of aftermath provided about one-fourth of the total pasture days for dairy cows on the large and medium-sized farms, but only one-tenth on the small farms. A few farmers in each group used rye or wheat for supplementary pasture in either the late fall or the early spring. The new seedings of grasses and legumes were pastured sparingly on several farms after the grain crop was removed.

The dairy young stock on farms of all size groups spent about 185 to 190 days on pasture in 1944. About 60 percent of the total pasture days were on permanent pasture and 30 percent on cropland pasture.

Conservation practices.-- The crop rotation used by most farmers leaves very little plowed ground unprotected during the winter. Ninety-four percent of all the farmers sowed small grains early in the fall on land that had been used for corn; 19 percent grew green-manure crops to be turned under in the spring.

Mechanical measures to conserve soil fertility are employed by more farmers in Harford County than in Howard County, partly because a soil conservation district has been established longer in Harford County. Of the Harford County farmers, 36 percent practiced strip cropping, 21 percent did contour cultivation, 9 percent used terraces, and 3 percent employed contour furrows in the pasture to increase yields. These practices were found as frequently on small farms as on the medium or large farms. In Queen Annes County, drainage is the major part of all conservation activities.

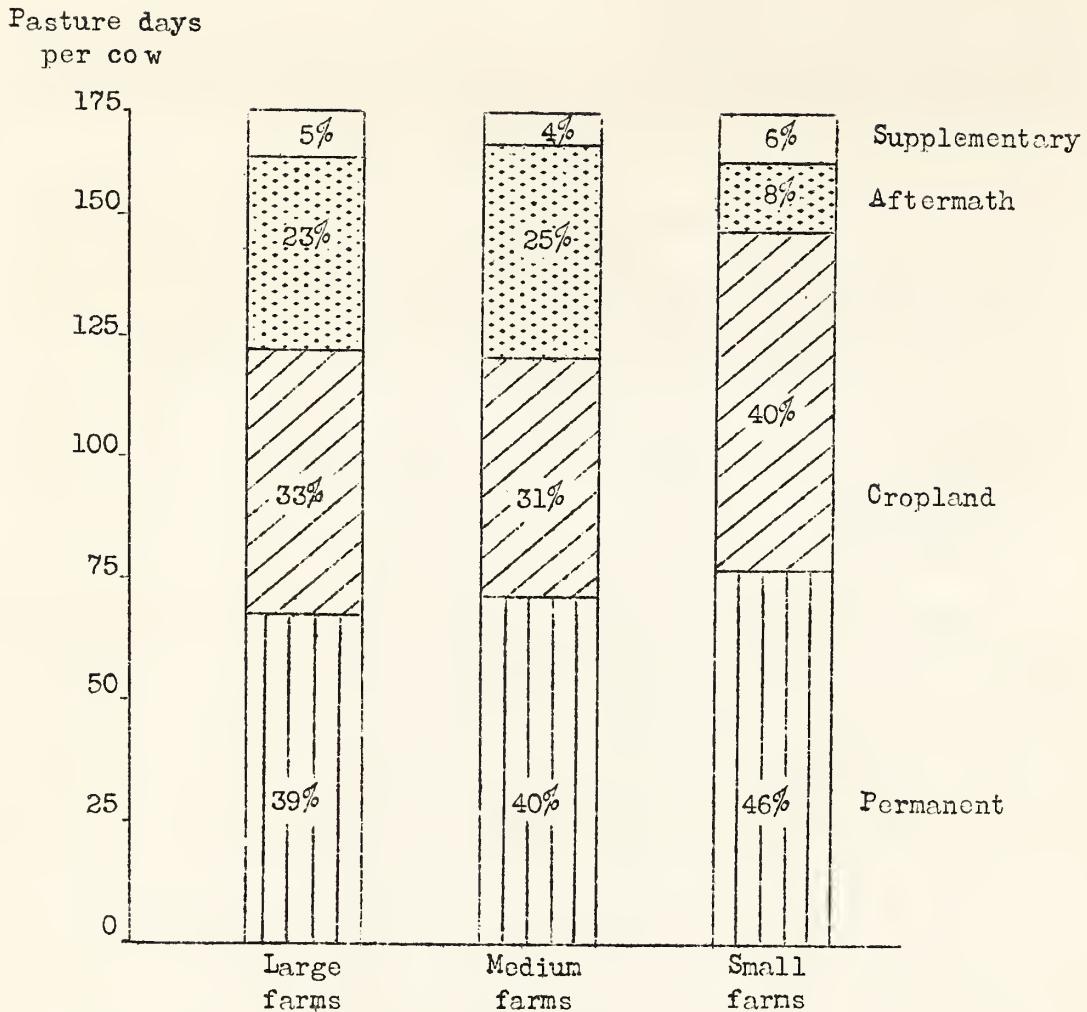


Figure 1.- Percentage of total pasturage used by dairy cows that was obtained from various kinds of pasture, by size of farm, 1944

Other cultural practices.- Fertilizing practices at planting time for corn, wheat, and barley are fairly uniform on all farms. However, only 4 out of 10 of the farmers on the large and medium-sized farms and only 1 out of 10 farmers on the small farms applied commercial fertilizer on hay fields so as to plow it under for the 1944 corn crop, even though this practice is strongly recommended by the State agricultural agencies. Thus, fertilizer was plowed under for only 10 percent of the total acreage of corn grown by the 98 farmers in 1944. A 3-12-6 or 2-12-6 analysis fertilizer made up 80 percent of the total tonnage of fertilizer used on all crops. Rates per acre for all farms growing each of the chief crops were as follows:

Corn	-	215 pounds
Wheat	-	366 "
Barley	-	346 "
Tomatoes	-	616 "
Sweet corn	-	211 "

Lime was used by about 75 percent of all the farmers. On all sized farms lime was used chiefly on the cropland; about half was applied before corn and most of the remainder after corn, in the rotation. The average rate of application by all farmers using lime was 1,830 pounds per acre. It was not greatly different on farms in the three size groups.

Other crop-management practices are summarized in table 9. At present, corn is cut by hand and gathered in small shocks for drying. The shocks are later opened and the ears are husked by hand. The stalks are then carried and placed in large shocks in the field so that they will not greatly interfere with the planting of wheat. During the winter these shocks are hauled to the barn or pasture lot for feed or bedding.

Table 9.— Percentage of operators who used various cropping practices in 1944, by size of farm 1/

Practice followed	Large	Medium	Small
	farms	farms	farms
	Percent		
<u>Corn</u>			
Used hybrid seed	88	91	72
Used 2-row planter	100	100	100
Used commercial fertilizer	84	79	72
Used 2-row tractor cultivator	51	36	31
Used 2-horse riding cultivator	46	64	69
Cut corn by hand	62	70	82
Cut corn with binder	29	7	0
Cut corn with 1-row horse sled	6	17	9
Used corn picker	3	6	9
<u>Wheat</u>			
Used certified seed	34	14	11
Used commercial fertilizer	100	100	92
Harvested with combine	17	17	8
Harvested with binder	83	83	92
<u>Barley</u>			
Used certified seed	27	13	11
Used commercial fertilizer	100	100	.89
Harvested with combine	33	13	11
Harvested with binder	67	87	89
<u>Hay</u>			
Used commercial fertilizer	44	39	9
Used horse mower	84	85	97
Used tractor mower	44	27	9
Used dump rake	47	61	97
Used buckrake	0	3	0
Used side delivery rake	72	42	3
Loaded by hand	38	61	97
Used loader	62	39	3
Unloaded by hand	3	6	72
Used hay fork	97	94	28

1/ Some farmers use more than one method in doing a certain job. For example, in cutting hay both horse and tractor mowers were used.

Present methods of harvesting corn for grain seem most in need of change on a large proportion of the farms. The problem is difficult because the corn must be harvested in time for wheat to be planted and make sufficient growth before freezing weather. Many farmers also need the stalks for bedding purposes. Corn pickers, used largely on a custom basis, would solve the picking problem, but preparation of the land for wheat would be delayed from 1 to 2 weeks and plowing might be necessary to cover the stalks. A machine that will pick the ears and chop the stalks in the field has been developed. When available, this machine should help to solve the problem on farms where sufficient bedding is obtained from other sources. On other farms the use of a binder and husker-shredder appears to be the best solution.

#### Livestock and Livestock Practices

Numbers and production rates.-- The number of dairy cows was one of the main factors used in selecting the sample farms. Herds containing 30-35 cows, 19-21 cows, and 7-9 cows occurred most frequently in the three counties, and farms having these numbers of cows were designated as large, medium, or small. Small poultry flocks were kept by all groups for home supply of meat and eggs, but some supplementary income was received from these sources (table 10). The number of workstock per farm in the large and medium-sized groups was larger than one would expect considering the number of tractors found on these farms.

Table 10.- Average number of principal classes of livestock on farms, by size of farm, 1944

Item	Large farms	Medium farms	Small farms
<u>N u m b e r</u>			
Dairy cows	31	20	9
Dairy heifers	10	8	5
Hens and pullets	150-200	100-150	100-150
Broilers	50-100	50-100	50-100
Sows farrowed	2.5	2	1
Pigs fattened	18	11	10
Workstock	5	5	3

Production per cow and per hen was higher on the large farms than on farms in either of the other two groups. The rate of production per cow in all three groups was considerably above the State average because these are specialized dairy farms located in the main dairy areas of the State (table 11). A larger proportion of the farms are operated on a commercial basis. Egg production per hen was only slightly above the State average.

Table 11.- Average milk production per cow and egg production per hen on 98 Maryland dairy farms, by size of farm, compared with State average, 1944

Item	Unit	Large farms	Medium farms	Small farms	Average 98 farms	State average
Milk per cow	Pounds	6,821	6,127	5,360	6,102	4,656
Eggs per hen	No.	124	115	109	116	110

Management practices.- The concentrate feed used for the dairy herd was generally mixed from home-grown grains and a purchased supplement. An average of 1 pound of concentrate was fed for each 2.9 pounds of milk produced on farms in each of the size groups. As average production per cow was directly related to herd size, the average total quantities of concentrates fed annually per cow on different sized farms were as follows:

Large farms - 2,350 pounds  
Medium farms - 2,160 "  
Small farms - 1,850 "

These differences in feeding rates are important differences in the management of the three groups of dairy farms, especially for those between the small farms and the large farms.

During the barn-feeding period the average rate of feeding of concentrates was 8.7 pounds per cow per day. Farmers in all herd-size groups reduced the rate of concentrate feeding during the pasture season (about May 10 to October 10) to an average of about 4 pounds per cow per day. Four operators of small farms and one in each of the other groups fed no grain to the cows during the pasture season. Young stock were fed about 2.7 pounds of grain per head per day during the winter months.

Each farmer was asked if he fed concentrates according to the production of each cow. Affirmative answers were made on 56 percent of the large farms, 59 percent of the medium farms, and 4 percent of the small farms. But when the answers were later checked with reported production and feeding rates, the latter revealed that many farmers who believed they adjusted the quantity of concentrates to production were often feeding low producers relatively more than high producers.

The starting date for feeding roughage was influenced by the condition of pastures, the weather, and the supply of roughage, but most farmers began about October 15. Clover and timothy hay was the principal roughage. Corn silage was used on 66 percent of the large, 44 percent of the medium, and 16 percent of the small farms. Some stover was used on most of the farms surveyed.

Operators of the large farms raised fewer replacements per cow than those of medium-sized and small farms, but the calves and heifers were managed about the same way by all groups (table 12).

Table 12.- Percentage of farm operators who used specified livestock management practices in 1944, by size of farm

Practice	Large	Medium	Small
	farms	farms	farms
	<u>Percent</u>		
<u>Replacements</u>			
Raised own replacements	91	100	93
Weaned calves at:			
1-13 days	29	41	28
2- 8 weeks	68	56	56
8 weeks and older	3	3	16
Fed calves milk up to:			
2-4 weeks	27	15	10
5-8 weeks	59	55	57
9 weeks and older	14	30	33
Used calf starter	67	76	55
Bred heifers to freshen at:			
21 months and under	0	0	7
21-24 months	43	49	58
25-28 months	30	15	16
29-36 months	27	36	19
Used registered bulls	56	45	19
Used purebred bulls	38	24	36
Used grade bulls	6	31	45
Belonged to DHIA	28	9	0
Interested in artificial breeding	63	38	28
<u>Chores</u>			
Used watering cups in barn	63	47	9
Used milking machines	72	26	3
Removed manure daily with spreader by driving through barn	16	3	0
Used manure carriers to heap or spreader	3	0	0
Removed manure with wheelbarrow or by pitching out	81	97	100
<u>Disease control</u>			
Tested cows for Bang's	50	41	47
Tested cows for mastitis (by veterinarian)	34	32	19
Vaccinated calves	75	47	35

Disease control ranks high in maintaining and increasing production efficiency on Maryland farms. Control of mastitis is one of the most difficult problems. The survey showed that farmers were beginning to recognize this problem. About 25 percent of the farmers reported that mastitis was materially decreasing their milk production. One-third of the operators have had their herds examined by veterinarians and have tried to clear up the disease by using a strip cup to ascertain whether the cow is affected, by milking affected cows last, and by improving general sanitary conditions.

Bang's disease has also been rather troublesome. Approximately 50 percent of the farmers have had their cows tested for Bang's and, of these, nearly one-half have removed the reactors. Calfhood vaccination is now being used more widely, especially on the larger farms. Calfhood vaccination, plus blood testing, and a program for removing reactors gives promise of reducing this trouble in the future.

#### OPPORTUNITIES FOR FARMING ADJUSTMENTS

Farming methods have advanced greatly in recent years but they have not been adopted uniformly. Farmers, like other people, vary in their acceptance and use of new methods. Thus at any particular time a wide range in the production practices used on different farms may exist even within small areas.

Such wide variation in management practices was found on Maryland dairy farms in 1944. Of the 98 representative farms studied, some operators were using advanced methods as recommended by agricultural research agencies; others were not. Very few of the operators, however, had adopted improved management in all phases of dairy farming. Some had improved cropping practices but had failed to hold disease in check in their herd. Others were using superior methods in herd management but were using labor ineffectively in both field and barn work.

In general, present production practices lagged far behind recommendations. Contrary to expectations, management practices were fairly similar in all size groups, excepting that on the larger farms the dairy herds were managed somewhat more intensively and more machinery was used.

The State-wide appraisal of adjustments that would be profitable for Maryland farmers under prosperity conditions outlined opportunities for increasing production efficiency and raising farmers' incomes 3/. These suggested adjustments for dairymen discussed very little that was generally new in the way of management changes. Rather, the adoption and integration of proven practices were stressed.

Desirable cropping practices recommended generally for dairymen called for recognition of the limitations imposed by the land itself. Crop rotations and cultural methods should vary according to the land capabilities rather than to arbitrary or customary plans. The present basic cropping system should remain, but crop rotations and tillage methods should vary according to limitations of land areas within the boundaries of each farm. Kinds, rates, and placement of fertilizer should vary according to land characteristics as well as to needs of the crops. Coupled with these changes should be such shifts as the use of heavier yielding crops and crop varieties. These changes would lead to the production of more roughage of higher quality without depleting soil resources.

In both field and barn work recommended adjustments stressed the use of additional machinery and equipment. Specialized harvesting equipment used on a custom basis was suggested. All farm work should be scrutinized to determine the best techniques to follow. Modern methods of crop harvesting, milking, and doing chores would greatly increase output per man.

The report pointed out that steps taken to increase roughage production and output per man might lead to increases in the size of the herd on some farms. On others, the operator might wish to benefit from these adjustments in the form of more leisure time. In all herds increased production per cow was recommended through control of disease, adjustment of concentrate feeding to individual production, and use of proven sires.

The comparison of present management on Maryland dairy farms with recommended practices has given a better basis for indicating possible changes. It has shown that the problem of increasing production efficiency is of major importance for most dairymen. At present, operators with large dairy herds are not using much more efficient practices than operators of medium and small sized herds. Basic adjustment programs are similar for most farms, but the application of the program varies for each farm and each operator. Details of the steps in an adjustment program and of the influence upon production and income for three different-sized farms are given in the following section. Farmers, farm organizations, and public agencies serving farmers may get help and stimulation from a study of adjustments on these individual representative farms.

#### SUGGESTED ADJUSTMENTS ON REPRESENTATIVE FARMS

Maryland dairymen will be making management changes in the next few years to increase operating efficiency. Many of these changes will be adjustments that have been long recommended; others will be born of recent and future technological improvement. In this section, details are given on the influence of adjustments recommended by men familiar with the many phases of Maryland agriculture on farms representative of dairy farms frequently found in the main dairy area 4/. All farms will not have these patterns of adjustments but these are the general changes that seem desirable for dairying in the area.

The suggested changes are made with the following assumptions in mind.

1. The postwar period will be one of general economic prosperity.
2. The demand for fluid milk from the Maryland production shed will equal or exceed the wartime demand.
3. Mechanization of farming operations will continue.

In evaluating the effect of management changes, a sufficiently long period must be considered to escape fluctuations in the transition period.

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4/ The adjustments outlined in the case farms follow recommendations for Maryland dairymen made by specialists of the University of Maryland Agricultural Experiment Station or Extension Service and of the U. S. Department of Agriculture and originally reported in the 1950 Production Adjustment report for Maryland.

FARM A - A 32-COW DAIRY FARM

Farm A has been selected as representative of the large dairy farms. Although the acreage of permanent pasture is slightly higher and the acreage of grain is slightly less than the modal situation, other characteristics are rather typical.

Major changes recommended are: (1) Adapting cropping intensity and methods to land capabilities, (2) increasing roughage at the expense of small grains, (3) increasing number of dairy cows in total and per man, and (4) increasing mechanical efficiency of field work and barn chores.

The estimated impact of these and other minor adjustments is summarized by the following measures.

	<u>Present plan</u>	<u>Proposed plan</u>
Size of business:		
Acres of crops excluding permanent pasture	109	119
Number of cows	32	42
Number of animal units 1/	49	58
Number of man work units 2/	816	924
Number of man equivalent 3/	2.7	2.4
Rate of production:		
Pounds of milk per cow	6,800	7,400
Index of crop yields 4/	100	143
Labor efficiency:		
Man work units per man	302	385
Number of cows per man	11.8	17.5
Cwt. of milk produced per man	806	1,295
Returns:		
Increase in net cash income	xxx	2,200

- 
- 1/ An animal unit is one dairy cow or the equivalent of other livestock on the basis of all feed consumed.
- 2/ A man work unit is the average amount of productive work accomplished by an able-bodied man in a 10-hour day under average farm conditions using customary farm equipment.
- 3/ A man equivalent represents the farm work done in a 12 months' period with all work expressed in terms of that performed by an able-bodied man devoting full time to the farm work.
- 4/ Productivity of intertilled, close-growing, and hay crops, weighted on the basis of man-work units, expressed as a percentage of the present production level.

Cropland adjustments. - Improved land use is a fundamental change proposed for this farm and the large farms represented by this example. Because of varying kinds of soils, slopes, and past uses, areas of the crop and pasture land should be operated differently so as to maximize yields while maintaining or increasing soil productivity.

Only a small area of the cropland is sufficiently flat and well-drained to be cultivated with ordinary farm practices (fig. 2). This is included in 60 acres of cropland where a short and intensive rotation can be used safely if contour cultivation and simple drainage practices are carried out. On 59 acres a long rotation must be used in conjunction with contour cultivation if the land is to be used without depleting soil fertility.

Thus, several crop rotations are suggested to replace the one generally found in the area and now used for all different fields. About 30 acres will be included in a 4-year rotation of corn, winter wheat, and 2 years of clover-timothy hay. Another 30 acres will be used for corn, winter wheat or winter barley, and 4 years of alfalfa. Where cultivated crops can be grown but infrequently, a 6 or 7 year rotation of corn, winter wheat, and ladino clover-mixed grasses will be used for both hay and pasture.

Crop-management practices.— Changes in management practices for each crop are recommended along with shifts in land use. The estimated influence of these changes upon acreage and yield are summarized in table 13.

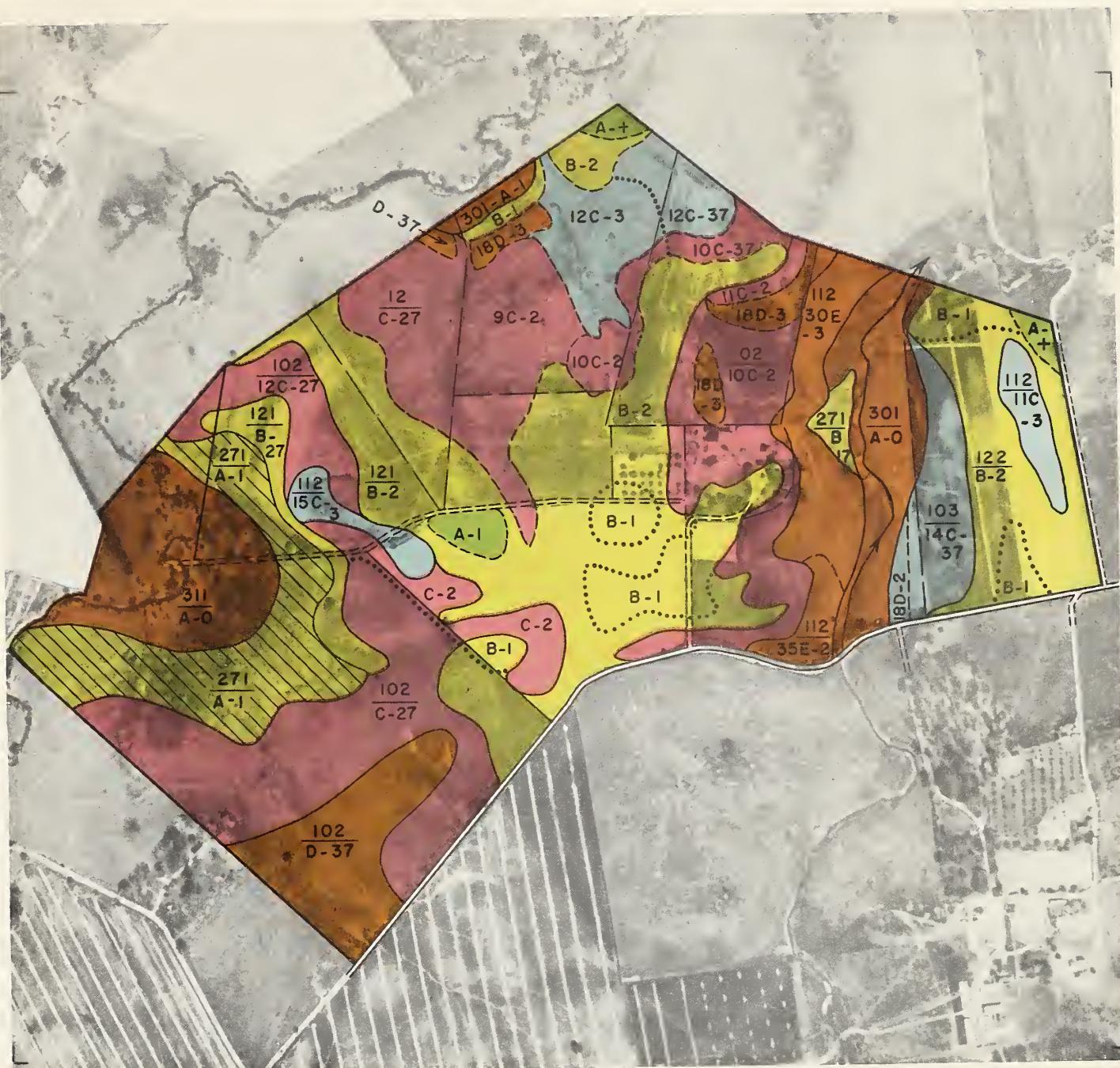
Table 13.— Acreage and yield of crops under present and proposed plan of crop management practices on a large Maryland dairy farm

Item	Present plan		Proposed plan	
	Acres	Yield per acre	Acres	Yield per acre
Corn for grain	17	40 bu.	9	70 bu.
Corn for silage	8	10 ton	12	13 ton
Wheat	25	25 bu.	21	29 bu.
Red clover mixed hay (2 cuttings)	20	1.3 ton	15	2.2 ton
Alfalfa hay (3 cuttings)	19	2.4 "	20	3.0 "
Cropland pasture	20	-	42	1.0 "1/
Permanent pasture	70	-	60	-
Woods	54	-	54	-
Miscellaneous	4	-	4	-
Total	237		237	

1/ One early cutting of ladino clover for hay or silage is proposed on 30 acres of this land when cattle are being carried on permanent pasture.

A liming program is recommended to reduce and hold the soil acidity to a pH of 6.0 to 6.5 — a slightly acid condition. Spreading lime directly from the truck used in hauling lime to the farm and upon sod land to be plowed for corn will facilitate the liming program. No change is suggested in the kind of fertilizer or the rate of application at planting time, but about 300 pounds per acre of a commercial fertilizer will be turned under when plowing for corn. On light soils, a fertilizer having a 1-1-1 or a 0-1-1 ratio would be used; heavier soils that are manured would only require the addition of superphosphate. Corn will be grown in strips along the contour and hybrid seed will be used for planting both grain and silage (fig. 3). The acreage of corn would remain about at the present level, but harvesting more as silage is recommended.

## LAND USE CAPABILITY MAP - FARM A



**Conservation Survey Symbol:**  $\frac{311}{A-1}$  =  $\frac{\text{SOIL}}{\text{SLOPE - EROSION}}$

**LAND USE  
CAPABILITY LEGEND**

Green	Suitable for cultivation with ordinary farm practices.
Yellow	Suitable for cultivation with simple conservation practices.
Yellow	Suitable for cultivation with simple drainage practices.

Red	Suitable for cultivation with more conservation practices or practices more carefully applied.
Blue	Suitable for occasional cultivation but better suited to hay or pasture production.
Orange	Suitable for permanent pasture, or woods, but not suitable for cultivation.

Brown	Suitable for forest or wildlife development but not suitable for cultivation and not usually recommended for pasture.
Purple	Land not suited to the economic production of cultivated crops, pasture or forest. Frequently suited to wildlife production.

Figure 2



## REVISED LAND USE MAP - FARM A



- Crop boundary
- Fence removal
- I—I Fence construction
- X— Existing Fence

Woodland not included in home farm

Figure 3



as one step in increasing the quantity of roughage. An additional small silo will be required for corn silage and can be used for grass silage early in each season. The acreage grown for grain will be harvested by a mechanical field picker-shredder on a custom basis.

Most of the present practices used in wheat production will be continued. Strip cropping and use of certified seed are suggested and should give greater certainty of good yields per acre. Harvesting will be done by combine on a custom basis and a pick-up baler will be hired to bale the straw.

Barnyard manure will be used for topdressing all land in hay. In addition, an annual topdressing of 300 pounds per acre of a 0-20-20 fertilizer is recommended for the ladino mixture. When the permanent pasture is producing well in the spring and early summer, a cutting will be made on the ladino mixed fields; later these fields will be pastured. If there is excellent weather the crop could be harvested as hay; usually it would be preferable to put it in a small silo as grass silage.

By using the three hay crops as discussed, haying will be extended over a longer period thus reducing the peak need for labor and spreading the risk from weather. Greater mechanization will also reduce labor requirements. Mowing, raking, and hauling will be done with the tractor. Cropland is close to the barn so that low, crib-like wagons with two movable bottom sections and holding from 1,500 to 2,000 pounds of dry hay could be used efficiently. One man can load one of these wagons in the field by allowing the hay to fall from the loader into the crib. One stop will be made to move forward a section once it is filled. While loading is underway, the regular hired man and a man hired for the haying season will be unloading at the barn by using slings, hay track, and a hay hoist, or possibly by using a hay blower if further experience with them is as promising as they look to be at present.

Under the revised plan a hay-pasture combination is suggested on 10 acres of the permanent pasture; 60 acres, which is quite badly eroded, should remain in permanent sod. Little has been done to increase production of the permanent pasture, and several years will be needed to rehabilitate the acreage required by the larger herd.

From 1 to 1 1/2 tons of lime per acre should be sufficient to reduce the soil acidity to a point favorable to wild white clover. Topdressing every 2 or 3 years with 1/2 ton of lime should bring better results than, say, a ton every 4 to 6 years. In addition, 500 pounds of superphosphate per acre will be needed at the start, after which a topdressing with 300 pounds once in 4 to 5 years will be needed. Other management practices, such as rotation grazing and mowing, should be started at once on the entire acreage. As the permanent pasture is improved these practices become very important to avoid spotty grazing.

Livestock adjustments.— Under average conditions, sufficient hay and silage for about 55 animal units could reasonably be expected. The dairy herd could be increased to 62 head - 42 in the milking herd and 20 young stock. Nearly 3.5 tons of hay equivalent per cow is suggested. This will be fed chiefly during the winter but some silage will be used during July and August when plant growth on pastures is retarded by the hot weather.

On similar farms some operators could keep more cows and raise only sufficient replacement stock to maintain the herd. Others could take advantage of increased crop yields to divert more cropland to vegetable production while maintaining the present size of the dairy herd.

Heavier feeding of higher quality roughage in both summer and winter will allow a reduction in the rate of concentrate feeding from an average ratio of 1 pound of grain for each 2.9 pounds of milk produced to a ratio of 1 to 3.6. Production per cow could be expected to increase about 10 percent because of the large increase in good pasturage, the reduction of mastitis and Bang's disease in the herd as outlined in Farm B, an adjustment of concentrate feed to milk production through DHIA activity, and minor changes such as better protection from flies and improved milking. The use of a proven sire is recommended and steps should be taken to raise well-grown and early freshening heifers for replacement.

Major changes in building facilities and chore techniques will make it possible to care for the 58 animal units with fewer workers and fewer working hours than is now required for 49 units. Beside the work done by the farm workers, a cash cost of \$600 will be made to remodel and enlarge the dairy stabling facilities. The cost will be amortized over a period of 20 years. An arrangement to minimize the time required for barn chores will be planned. For example, manure will be removed by driving through the stable daily with a spreader. The dairy stock will be in one area; doors, walks, and feeding chutes will be arranged to reduce the distance traveled. Operators who expand the dairy beyond this level or who have a costly remodeling problem can use to good advantage the pen barn-milking stable method of housing. For herds of more than 40 cows, this method may be the most economical if adequate facilities do not exist already. This is one problem on which more research is needed. Using modern milking methods and a planned milking procedure will reduce the milking time per cow to an average of 3 to 4 minutes. By improved arrangement, superior methods, adequate equipment, and a planned work program to avoid wasted effort, chore time can be reduced 20 to 30 percent.

No workstock will be kept on this farm. As the need arises, team work will be hired as shown in the table of expenses.

Effect of adjustments on farm income.— Trends in Maryland dairying have been accelerated and knitted together on Farm A to allow for a large increase in output per unit of input — especially output per man.

Adjustments in crops and cropping practices on Farm A are aimed at supplying sufficient high quality roughage for a larger dairy unit without depleting soil resources. Superior methods, facilities, and equipment used in field and barn work allow a smaller labor force to operate this larger unit.

One result of these management changes on Farm A will be an increase of more than 60 percent in milk production per man. Yet this important change is not accomplished by working harder and for longer periods. Through specialization total work units would increase only 13 percent, and many of the more strenuous jobs would be easier. Actually more leisure time will be available.

A fairly close check on changes in income indicates that the annual net cash income will be increased about \$2,000 if prices are similar to those of 1943 (table 14). The investment of the operator will have increased by \$2,800.

Table 14.- Estimated change in annual net cash farm income accompanying adoption of proposed management adjustments on Farm A 1/

Item	Quantity	Price 2/	Reduced receipts or increased expense	Additional receipts or reduced expense
		Dollars	Dollars	Dollars
<u>Reduced receipts</u>				
Corn for grain	50 bu.	1.00	50	
Wheat	16 "	1.22	20	
<u>Additional receipts</u>				
Milk	932 cwt.	3.80		3,542
Veal calves	10 "	14.00		140
<u>Additional expense</u>				
Concentrate feed for dairy	8.8 tons	45.00 3/	396	
Fertilizer	12.1 "	30.00 3/	363	
Lime	20.0 "	5.50	110	
Ladino seed mixture	180 lbs.	0.30 3/	54	
Combine rental	21 acres	4.00	84	
Baler rental	21 "	4.00	84	
Picker-shredder rental	9 "	7.00	63	
Milk cartage	932 cwt.	0.15	140	
DiIA dues and testing			90	
Veterinary and medicine			224	
Fencing			30	
Gas, oil, grease, repairs on tractor	200 hours		60	
Team rental			18	
Depreciation and repairs on additional equipment			145	
Depreciation and repairs on additional buildings			80	
Interest	\$2,800	0.04	112	
Miscellaneous livestock expense			80	
<u>Reduced expense</u>				
Concentrate feed for horses	5 tons	40.00		200
Miscellaneous expenses for horses				70
Fertilizer	1.2 tons	30.00 3/		36
Seeds	300 lbs.	0.22 3/		66
Threshing and binding				35
Depreciation and repairs on binder, mower, rake				40
Labor	3.6 months	75.00		270
			2,203	4,399
Increase in annual net cash income				2,196

1/ After sufficient time has elapsed for adjustment program to have been completed.

2/ Prices assumed are similar to those used in 1950 Production Adjustment report.

Some prices reflect an anticipated change from expected technological improvement.

3/ Average price weighted according to proportion each component is of the whole.

4/ Of the capital needed for these adjustments, \$2,000 will be borrowed; the remainder will be furnished by the operator.

FARM B - A 20-COW DAIRY FARM

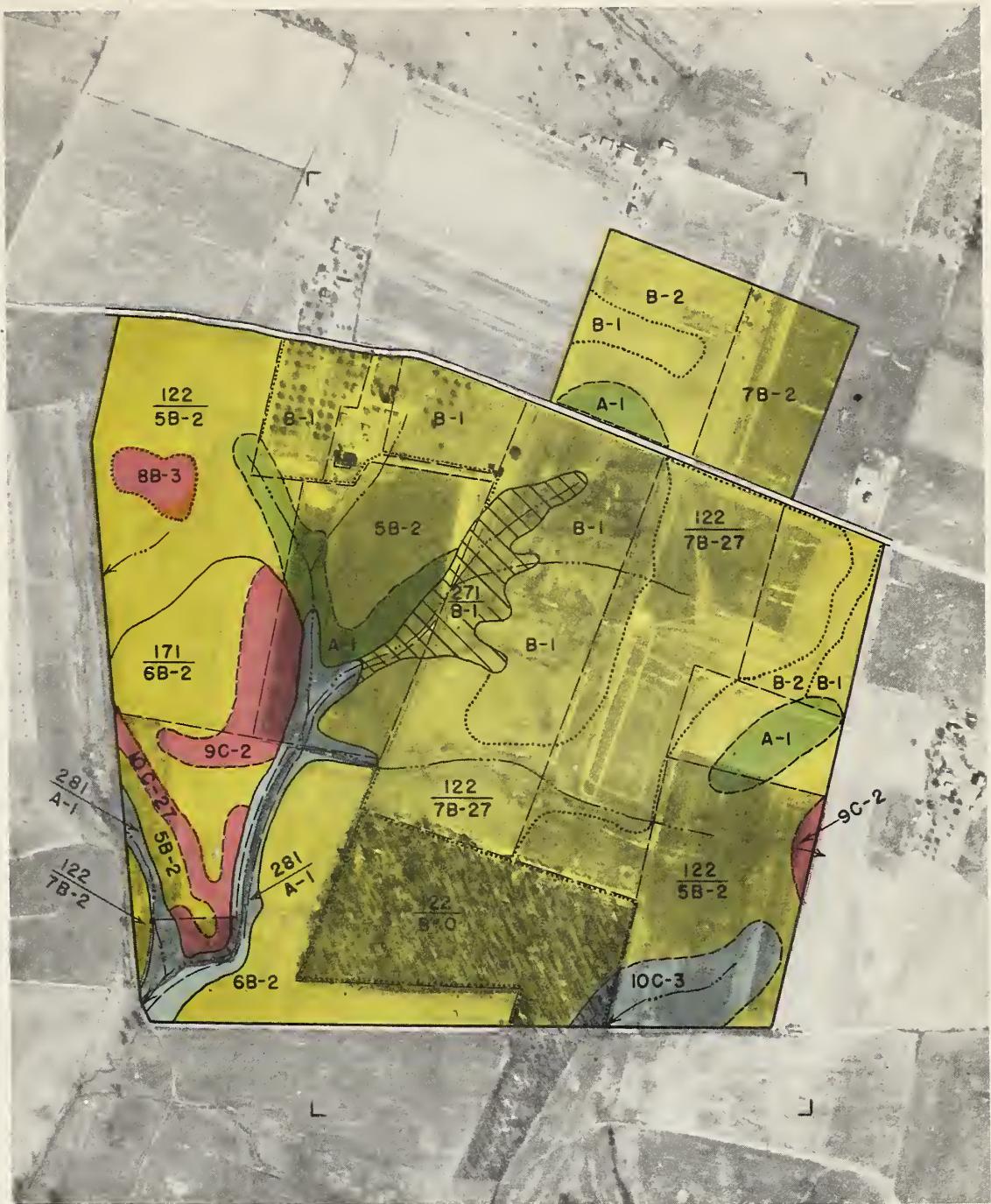
Farm B is representative of dairy farms in the medium-size group. Adjustments on this farm are indicative of changes that would apply fairly generally throughout farms of this size. Fundamental adjustments resemble those on Farm A as follows: (1) crops and cropping practices will be tied in closely with land capabilities, (2) herd size will be increased, and (3) more efficient methods in field and barn work will be introduced. A summary of the influence of these and minor adjustments is given in this tabulation.

	<u>Present plan</u>	<u>Proposed plan</u>
Size of business		
Acres of crops excluding permanent pasture	94	98
Number of cows	20	30
Number of animal units	35	42
Number of man work units	614	768
Number of man equivalent	2.1	2.0
Rate of production		
Pounds of milk per cow	6,100	7,000
Index of crop yields	100	159
Labor efficiency		
Man work units per man	292	384
Number of cows per man	9.5	15.0
Cwt. of milk produced per man	581	1,050
Returns		
Increase in net cash income	xxx	2,500

Cropland adjustments.— Rearrangement of cropping areas is recommended to increase the efficiency of the farm lay-out, to facilitate the use of modern farm machinery, and to better adapt crops to land capabilities (fig. 4). It is planned that small, hilly fields, distant from the barn, will be shifted to permanent pasture. In turn, 18 acres of well-drained permanent pasture land will be used in a hay and pasture combination. A long rotation combined with strip cropping will safeguard soil fertility of this area. Five or six years of hay, to be plowed when the stand is thin and immediately resown in wheat, will give a maximum degree of surface protection. Hay will be cut early in each season so the acreage can be available for pasture after the permanent pasture is most productive.

On 80 acres of cropland, a 4-year rotation of corn, small grain, and clover hay can be used in conjunction with contour cultivation and strip cropping (fig. 5). As alfalfa is not adapted to the land in this farm, a longer rotation is not consistent with high yields of hay unless ladino clover proves to be well adapted and improved ways of handling the hay can be developed. Part of this acreage is better suited to barley than to wheat. Characteristics of the land itself will determine whether other farms in this size group should substitute barley for wheat on certain fields.

## LAND USE CAPABILITY MAP - FARM B



Conservation Survey Symbol: 122  
A-1 = SOIL  
SLOPE - EROSION

## LAND USE

#### CAPABILITY LEGEND

Green

Suitable for cultivation with ordinary farm practices.

**Yellow**

Suitable for cultivation with simple conservation practices

Yellow

Suitable for cultivation with simple drainage practices.

Page

Suitable for cultivation with more conservation practices or practices more carefully applied.

Blu

Suitable for occasional cultivation but better suited to hay or pasture production.

## Orange

Suitable for permanent posture, or woods, but not suitable for cultivation.

BERWIR

**I** Suitable for forest or wildlife development but not suitable for cultivation and not usually recommended for pasture.

**Land not suited to the economic production of cultivated crops, pasture or forest.**  
**Frequently suited to wildlife production.**

Figure 4



## REVISED LAND USE MAP - FARM B

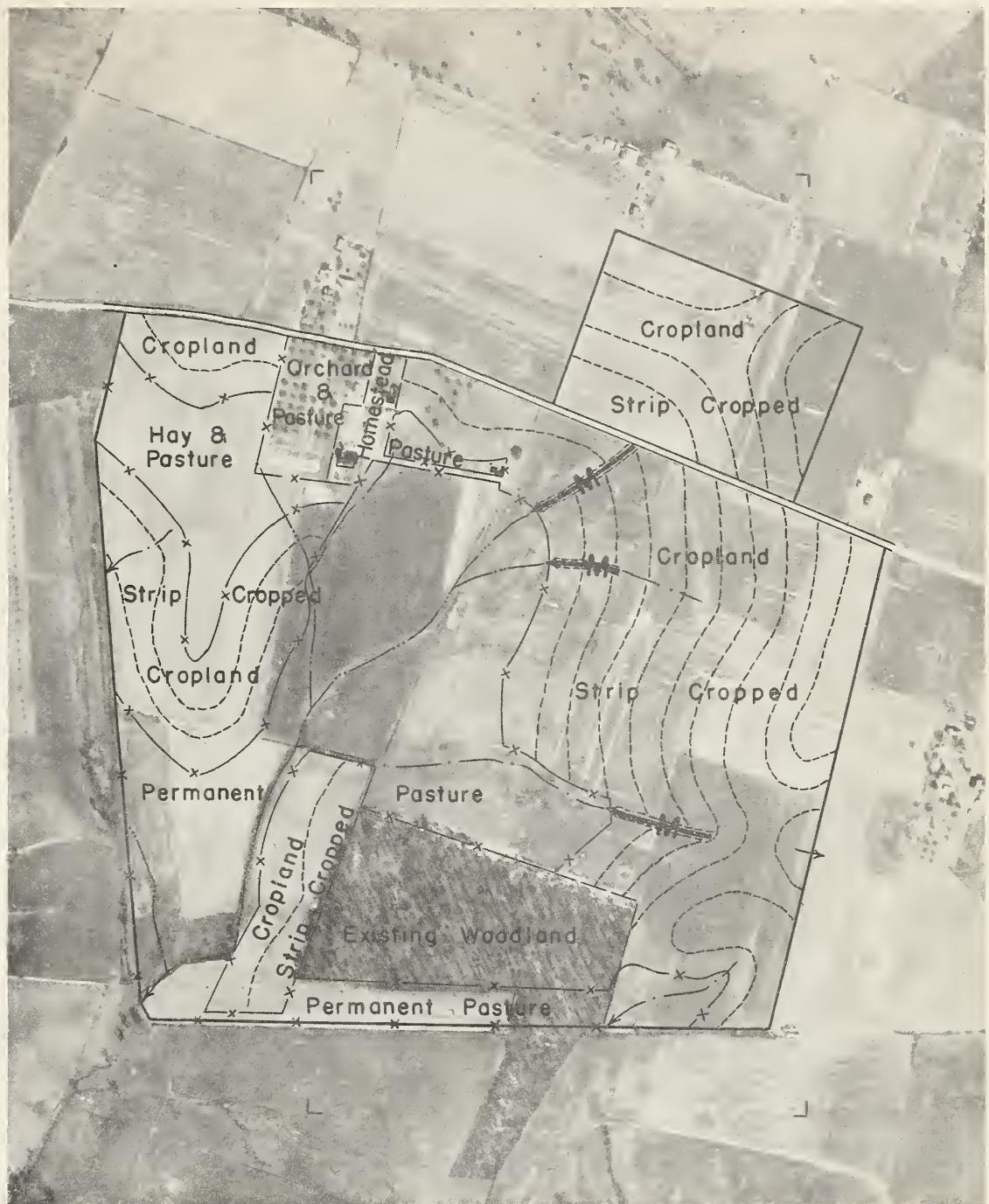


Figure 5



Crop-management practices.— The influence upon acreages and yields of adjustments in cropland use and cropping practices discussed in the following paragraph are estimated in the following table.

Table 15.— Acreage and yield of crops under present and proposed plan of crop management practices on a medium-sized Maryland dairy farm

Item	Present plan		Proposed plan	
	Acres	Yield per acre	Acres	Yield per acre
Corn for grain	16	40 bu.	12	70 bu.
Corn for silage	8	10 ton	8	13 ton
Wheat	25	25 bu.	11	29 bu.
Barley	-	-	12	35 "
Red clover mixed hay (2 cuttings)	26	1.3 ton	40	2.2 ton
Soybean hay (1 cutting)	4	1.4 "	-	-
Cropland pasture	15	-	15	1.0 " 1/
Permanent pasture	39	-	35	
Woods	18		18	
Miscellaneous	4		4	
Total	155		155	

1/ One early cutting of ladino clover for hay or silage is proposed on this land when cattle are being carried on permanent pasture.

Some of the adjustments in cropping practices resemble very closely those discussed under Farm A. They are presented here only in summary form (table 16).

Moving hay to the barn with a buckrake is a relatively new method in the Northeast yet it appears promising for the medium-sized farms. Improved engineering will probably make a tractor buckrake a practical tool in the next few years. A good operator can load from 800-1,200 pounds per load and if distance is not too great can make several loads per hour. Use of a hay blower at the barn eliminates much of the heavy work of mowing. One man can store 4-5 tons per hour with present blowers. Pitching from the loosely packed buckrake load into the blower is far easier than handling hay in the mow.

By adding more tractor equipment than used at present, all field work could be done with a tractor. This change, in addition to custom harvesting of many crops, will eliminate much of the heavy work and will release labor for other phases of the dairy enterprise, other farm enterprises, or for work off the farm. Operators of farms in this size group could do custom work with such machines as combines, balers, corn harvesters, and corn pickers. It is suggested that the operator of this farm operate a combine for about a month of off-farm work, or on 125 to 150 acres. Arrangements for this work should be planned in advance with a group of farmers but a flexible schedule should be maintained. Time worked off the farm will be mostly offset by having the small-grain straw and ensilage harvested and the corn for grain husked and shredded on a custom basis.

Table 16.- Proposed crop-management practices on Farm D

Crop	Main crop management adjustments relative to			Harvest
	Seed	Lime	Fertilizer	
Corn for grain U. S. No. 13 Funks G 94	According to test. Spread from truck on sod before corn.	Phosphated manure plowed under. 350 lbs. of 3-12-6 per acre at planting. do.	Picked and shredded. in field on custom basis.	
Corn for silage Funks G 135	do.		Field chopped on custom basis. Low tractor trailers for hauling. Temporary silo if needed.	
Wheat Thorne certified seed	xxx	400 lbs. of 2-12-6 per acre at plant- ing.	Combined. Straw baled on custom basis.	
Barley Wong certified seed	xxxx	do.		
Clover mixed hay Red clover 4 lbs. Alsike " 2 " Timothy " 5 "		Phosphated manure.	Tractor mower and rake. Buckrake for load- ing. Slings or hay blower for unloading.	
Hay-pasture combination Alfalfa Ladino cl. Orchard gr. Timothy	8 lbs. 1 " 8 " 5 "	According to test. Spread from truck.	300 lbs. of 0-20-20 per acre.	Early cutting of hay. Rotational grazing. Scatter droppings. Mow weeds and tall grass.
Permanent pasture	Reseed some areas. Scarify sod.	According to test. Spread from truck where possible.	300 lbs. of 0-14-6 per acre every 4 years.	Rotational grazing.

Livestock adjustments.— A main result of the suggested cropping adjustments will be an increase in the production of roughage. On this farm it is planned that the increased roughage be used to expand the dairy enterprise. Other farms in this size group might expand a beef or dairy replacement stock enterprise, particularly if their pasture acreage is above average. Still others, with cropland adapted to commercial vegetables, could expand vegetable acreage and still maintain the present size of the dairy.

The addition of 10 more dairy cows and 3 more dairy young stock than are kept under the present organization is suggested. Improved feeding and disease control should result in increased production per cow but improved breeding will not change production materially before 1950. Work stock will be eliminated and the small 100-bird broiler enterprise will be discontinued.

Expansion and rearrangement of stabling facilities, increased efficiency of chore technique, improved feeding of concentrates and roughages, and better methods of disease control will resemble those discussed for Farm A.

Recommended control measures for Bang's disease and mastitis are outlined as follows.

For control of Bang's disease: (1) vaccinate before 6 months of age all calves kept for replacement, (2) test all adult animals in the herd, and (3) institute a removal program for all reactors giving a reasonable time limit for disposal.

For control of mastitis: (1) test producing cows 3 times each year by veterinarian, (2) test all producing cows daily by operator using a strip cup, (3) use sulfa or penicillin drugs, by veterinarian, for infected animals, and (4) improve milking methods.

Effect of adjustments on farm income.— The complementary effect of management changes is well demonstrated on this representative farm. As on Farm A, improved use of the land and labor resources opens the way to a larger and more profitable business. Adjustments on medium-sized farms tend to differ in two respects from those on large farms (1) the field arrangement more frequently needs reorganization, and (2) these farmers have more time to operate specialized harvesting machinery on a custom basis in the community.

A check on income changes indicates that annual net cash income will be increased by about \$2,500 on Farm B under prices similar to those of 1943 (table 17). The operator's investment, including a combine for custom work, will increase by \$2,700.

Table 17.- Estimated change in annual net cash farm income accompanying adoption of proposed management adjustments on Farm B 1/

Item	Quantity	Price 2/	Reduced	Additional
			receipts or increased expense	receipts or reduced expense
		Dollars	Dollars	Dollars
<u>Additional receipts</u>				
Corn for grain	200 bu.	1.00		200
Small grains	100 "	1.10 3/		110
Milk	800 cwt.	3.80		3,344
Veal calves	6	14.00		84
Cull cows	1 unit	60.00		60
Custom combining	130 acres	4.00		520
<u>Additional expense</u>				
Concentrate feed for dairy	10 tons	45.00	450	
Fertilizer	11.5 cwt.	30.00 3/	345	
Lime	19	5.50	104	
Seed - Ladino mixture	96 lbs.	0.30	29	
Barley	18 bu.	2.00	36	
Baler rental	23 acres	4.00	92	
Picker-shredder rental	12 "	7.00	84	
Ensilage chopper rental	8 "	4.00	32	
Milk cartage	880 cwt.	0.15	132	
DHIA dues and testing			65	
Veterinary and medicine			224	
Fencing			60	
Team rental			16	
Gas, oil, grease, repairs, etc. on tractor	350 hours		105	
Depreciation and repairs on additional equipment			165	
Depreciation and repairs on additional stable			70	
Interest	\$2,700 4/	0.04	108	
Miscellaneous livestock expense			80	
<u>Reduced expenses</u>				
Concentrate feed for horses	5 tons	40.00		200
Miscellaneous expenses for horses				70
Fertilizer	1 ton	30.00 3/		30
Seed				45
Threshing and binding				35
Depreciation and repairs on binder, mower, rake, corn blower				36
Labor	1.2 months	75.00		90
			2,197	
Increase in annual net cash income				2,627

1/ After sufficient time has elapsed for adjustment program to have been completed.

2/ Prices assumed are similar to those used in 1950 Production Adjustment report. Some prices reflect an anticipated change, from expected technological improvement.

3/ Average price weighted according to proportion each component is of the whole.

4/ Of the capital needed for these adjustments, \$2,000 will be borrowed; the remainder will be furnished by operator.

FARM C - A 9-COW DAIRY FARM

Farm C, with a 9-cow dairy, was selected as representative of small dairy farms although it contains more permanent pasture and waste land than is usually found in farms in this size group. The basic adjustments for small farms are similar to those outlined for farms in the medium and large groups. The land together with its capabilities is the base for most adjustments recommended on this farm. Improved land use will allow more efficient production in the entire farm business (fig. 6). A summary of the influence of these basic changes and other adjustments discussed in the following sections is estimated in this tabulation.

	<u>Present plan</u>	<u>Proposed plan</u>
Size of business		
Acres of crops excluding permanent pasture	65	75
Number of cows	9	20
Number of animal units	19	29
Number of man work units	347	531
Number of man equivalent	1.3	1.3
Rate of production		
Pound of milk per cow	5,400	6,400
Index of crop yields	100	147
Labor efficiency		
Man work units per man	267	408
Number of cows per man	6.9	15.4
Cwt. of milk produced per man	374	985
Returns		
Increase in net cash income	xxx	1,300

Crop and livestock adjustments.— An adjustment program for small farms differs from those for farms in the larger groups in that smaller land resources set up one limitation to increasing returns either in the form of cash income or of more leisure time. As there is no appreciable difference between the groups in the average age of the operator, it is valid to assume on this basis as great a wish for increased returns by operators in this group as in the larger groups. Some operators who are favorably located may work part-time off the farm, but for those who do not want to do this there is ample opportunity to increase their income through reorganizing and increasing the efficiency of the farm business.

One solution is to have a highly intensified dairy enterprise along with improved land use. Only high producing cows would be kept and replacement stock would be limited to maintenance needs. Through the use of artificial breeding, the herd sire could be eliminated, making room for an additional cow and removing the risk and work associated with maintaining a sire on the farm. Other changes in the management of the dairy herd would resemble closely the improvements described for farms A or B. Only one team of horses or mules would be needed as it is recommended that the operator hire much of the field work done by specialized power equipment. A small flock of poultry would be kept mainly to meet the needs of the family.

Contour farming, strip cropping, and draining of some waste land are the main mechanical measures contemplated for improved land use (fig. 7). Other crop management practices resemble those outlined for Farms A or B. With these adjustments this farm could easily produce enough roughage for a 25-cow dairy, replacement stock, and a team of horses or mules (table 18). However, as many of the small farms would have less permanent pasture and would not be able to improve as much waste land, the herd was increased to 20 cows on this farm.

Table 18.- Acreage and yields of crops under present and proposed plan of crop management practices on a small sized Maryland dairy farm

Item	Present plan		Proposed plan	
	Acres	Yield per acre	Acres	Yield per acre
Corn for grain	17	40 bu.	10	70 bu.
Corn for silage	-	-	5	13 ton
Wheat	17	25 "	15	29 bu.
Red clover hay (2 cuttings)	16	1.3 ton	18	2.2 ton
Soybean hay (1 cutting)	7	1.4 "	-	-
Alfalfa hay (3 cuttings)	-	-	12	3.0 ton
Cropland pasture	8	-	15	1.0 " 1/
Permanent pasture	39	-	41	-
Woods	20		20	
Waste and miscellaneous	16		4	
Total	140		140	

1/ One early cutting of ladino clover for hay or silage will be made on 15 acres of the land used for hay and pasture when cattle are being carried on permanent pasture.

No change in the size of the labor force is suggested in carrying out the crop and livestock practices indicated above. About 1 man-month of labor will be hired through the use of specialized power equipment for field work. Purchase of a manure spreader and construction of a buckrake to be used on an old truck or car is suggested to ease the jobs that now require considerable time and hard work. Electricity will supply the power for a hay hoist, a shredder, and many other small tools suggested to increase the effectiveness of the labor force. If the operator and his family are freed from much of the field work, and the effectiveness of the labor force is increased, it will be possible to increase the number of cows handled per man from 6.9 to 15.4.

Effect of adjustment on farm income.— Under the assumed prices, an increase in net cash income of about \$1,000 per year could reasonably be expected from adjustments that intensify the dairy enterprise (table 19).

## LAND USE CAPABILITY MAP - FARM C



Conservation Survey Symbol:  $\frac{112}{A-1}$  =  $\frac{\text{SOIL}}{\text{SLOPE - EROSION}}$

LAND USE  
CAPABILITY LEGEND

Green	Suitable for cultivation with ordinary farm practices.	Blue
Yellow	Suitable for cultivation with simple conservation practices.	Orange
Yellow	Suitable for cultivation with simple drainage practices.	Orange

Suitable for cultivation with more conservation practices or practices more carefully applied.

Suitable for occasional cultivation but better suited to hay or pasture production.

Suitable for permanent pasture, or woods, but not suitable for cultivation.

Brown

Suitable for forest or wildlife development but not suitable for cultivation and not usually recommended for pasture.

Recommended for pasture.  
Land not suited to the economic production of cultivated crops, pasture or forest.  
Frequently suited to wildlife production.

Figure 6



## REVISED LAND USE MAP - FARM C



- Crop boundary
- X — Existing fence
- ← W → Grass waterway

Figure 7



Table 19.- Estimated change in annual net cash farm income accompanying adoption of proposed management adjustments on Farm C 1/

Item	Quantity	Price 2/	Reduced	Additional
			receipts or increased expense	receipts or reduced expense
		Dollars	Dollars	Dollars
<u>Additional receipts</u>				
Corn for grain	20 bu.	1.00		20
Wheat	10 "	1.22		12
Milk	794 cwt.	3.80		3,017
Veal calves	6 "	14.00		84
Cull cows	1 unit	60.00		60
<u>Additional expenses</u>				
Concentrate feed for dairy	9.4 tons	45.00	423	
Fertilizer	10 "	30.00 3/	300	
Lime	17 "	5.50	94	
Seed	156 lbs.	0.30 3/	47	
Plowing and harrowing	15 acres	3.50	52	
Combine rental	15 "	4.00	60	
Baler rental	15 "	4.00	60	
Corn harvester rental	15 "	2.00	30	
Ensilage cutter rental	65 "	0.40	26	
Milk cartage	794 cwt.	0.15	119	
DHIA dues and testing			55	
Veterinary and medicine			260	
Fencing			60	
Depreciation and repairs on additional equipment			140	
Depreciation and repairs on additional buildings			90	
Miscellaneous livestock expense			88	
Interest	\$2,200 4/	0.04	88	
<u>Reduced expense</u>				
Concentrate feed for horses	2 tons	40.00		80
Miscellaneous expenses for horses				35
Fertilizer	.5 tons	30.00 3/		15
Seed	12 bu.	1.75 3/		21
Threshing and binding				26
Depreciation and repairs on binder				6
Increase in annual net cash income			1,992	3,376
				1,384

1/ After sufficient time has elapsed for adjustment program to have been completed.

2/ Prices assumed are similar to those used in 1950 Production Adjustment report. Some prices reflect an anticipated change, from expected technological improvement.

3/ Average price weighted according to proportion each component is of the whole.

4/ Of the capital needed for these adjustments, \$1,600 will be borrowed; the remainder will be furnished by the operator.

Alternative adjustments.— Some of the younger operators on these small farms may wish to use tractor power on their farms. There may be many good reasons for this step but, from an economic standpoint, an operator should plan to do, in addition to his own work, at least 200 hours of custom work annually with the tractor to make this a profitable venture. Custom plowing or harrowing could be combined easily with dairying. Some of these operators who have mechanical ability and good business judgment would find it profitable to own and operate for custom work some of the specialized harvesting machines — such as combines, corn picker-shredders, forage harvesters, and balers — needed in the community as greater mechanization of the local agriculture takes place.

Another solution for operators with small acreages of cropland is to rent or buy more land as well as to improve the management of their own acreages. Information from the survey shows that very little land is available in these counties in units smaller than a farm. Combining two small farms presents fairly difficult management problems especially if the farms are not adjoining, but the use of a modern tractor with fairly high road speed and rubber-tired farm equipment reduces the problem of travel. The best use for a few acres of land and the buildings that would probably be on the additional farm might be as a retirement home for some older farmer of the area or as a home for a part-time farmer.

Still another alternative would be to diversify by expanding enterprises not greatly dependent upon the cropland and by making improvements in management of the dairy enterprise. Operators who have managerial ability as poultrymen might add a layer, broiler, or turkey enterprise.

One acre of cropland would return a net of about \$50 when used to provide feed for additional cows under an intensified dairy program. Another method of increasing returns on Farm C would be the use of some cropland for crops returning a net cash income in excess of this figure. Several vegetable crops commonly grown on these farms offer this opportunity. Wherever operators of small farms have suitable land and experience, the production of market or canning vegetables is a good alternative way to increase returns. Adapting crops and rotations to the land capabilities will increase the production of roughage sufficiently so that an expanded dairy enterprise can be maintained at the same time that vegetable production is undertaken.

Thus there are various opportunities for a satisfactory increase in returns on the small farms. Improved land use opens the way to an intensive dairy or dairy-vegetable enterprise, or an expanded dairy enterprise combined with other enterprises which are not tied closely to the amount of cropland. Poultry and the operation of specialized machinery on a custom basis are examples.

## SUMMARY AND CONCLUSIONS

This study answers the question of how closely Maryland dairymen in general are following methods recommended by research and extension agencies and suggests adjustment programs for bridging the gap between recommendations and practice.

Information about present practices and the physical plant was obtained on large (30-35 cows), medium (19-21 cows), and small (7-9 cows) dairy farms in 1945. The crop and livestock practices were generally far removed from those commonly recommended by agricultural specialists and the methods used by the more efficient farmers. Contrary to expectations, management practices were also fairly similar in all size groups, excepting that on the larger farms the dairy herd was generally managed somewhat more intensively. This difference, together with the greater use of labor-saving machinery, made for more efficient production on the larger farms in terms of milk produced per man.

Most of the farms have opportunities for major improvements in management. The recommended adjustments are rather similar for all size groups and are discussed for three selected case farms. In each case, large strides are possible in the amount of production in relation to the resources expended in production. This is especially true of output per man. For, as in industry, technological changes of the last few years have increased production possibilities greatly on dairy farms without increasing the need for additional work. Potential increases in production and income were so great from simple management changes that it was unnecessary to consider adding land acreage to the farms.

The recommended adjustments bring out very little that is new. Rather, trends that are already a part of Maryland dairying will have been accelerated and knitted together on these farms, with some difference in emphasis because of the difference in physical plant of the large, medium, and small farms. Following are highlights of the program.

1. By adapting crop rotations and cultural methods to land capabilities and by using improved seeding and fertilizing practices, enough roughage can be produced for a larger number of livestock without depleting soil resources.

2. By increased mechanization based upon the rubber-tired general-purpose tractor, and by increased uses of specialized harvesting equipment on a custom basis, field work can be done with considerably fewer man hours of work.

3. By spending relatively more man hours directly upon the dairy herd, by adopting modern milking methods, and by improving barn arrangements and chore techniques, a larger dairy herd can be cared for by a smaller labor force.

4. By improved methods of disease control, feeding more high-quality roughage, adjusting concentrate feeding to individual production, and using superior proven sires, more milk will be produced per cow.

Along with the increase in production there will be an increase in returns realized either as greater net cash income or as more leisure time. Under prices similar to those of 1943, the increase in income would be substantial, but these adjustments in the direction of increased efficiency are desirable under most conditions. Not only is there the possibility of larger incomes to farmers who adopt the practices, but eventually these shifts should mean a higher level of living.

Discussion of the case farms should be considered as pointing the way to kinds of farming adjustments rather than outlining a specific program. Differences between farms in the physical factors and operators in managerial ability make a rigid, over-all program impracticable. More research is needed to discover the basic factors that are behind all management activity, and to determine the feasibility of grouping farm operators on the similarity of those factors. Potential farming adjustments need to be related to differences in managerial ability of farmers as well as to differences in physical features of the farms. With this background, greater progress could be made in improving techniques for encouraging adoption of these management practices. We would have a better basis for suggesting which farms are best fitted to make changes, the best alternative uses for excess land, labor, and capital now employed in agricultural production, and a host of other questions stemming from production adjustments on Maryland dairy farms.

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